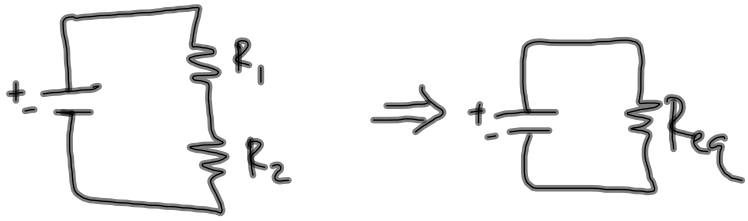
- Test Friday, 11/18

  $\vec{F}, \vec{E}, U_e, \Delta V$

  Circuits

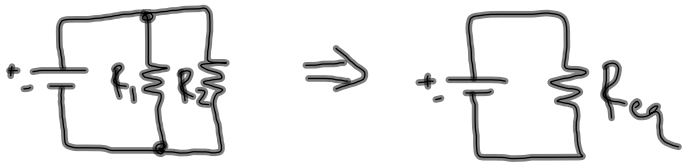
Equivalent Resistance:

- Resistors control current
- $V = IR$ (Ohm's Law)
- We want to know how much current, so we need equivalent resistance
- Series:

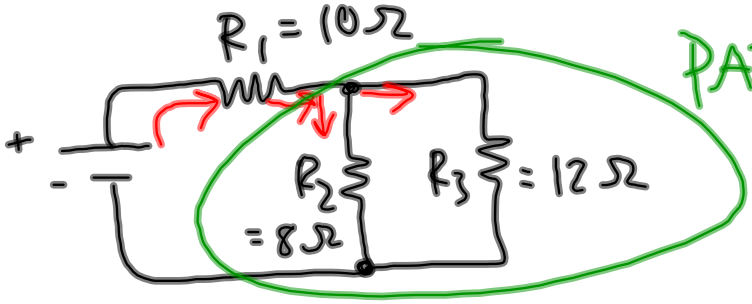


$$R_{eq} = R_1 + R_2$$

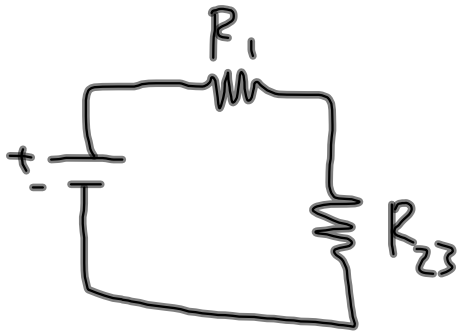
- Parallel



$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$



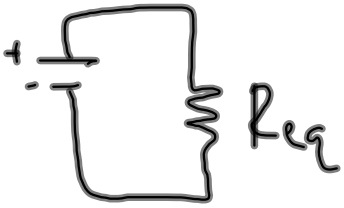
- Work from point furthest from battery towards the battery
- Simplify to 1 R_{eq}



$$\frac{1}{R_{23}} = \frac{1}{R_2} + \frac{1}{R_3}$$

$$R_{23} = \left[\frac{1}{8\Omega} + \frac{1}{12\Omega}\right]^{-1}$$

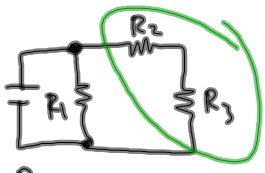
$$= 4.8\Omega$$



$$R_{eq} = R_1 + R_{23}$$

$$= 10\Omega + 4.8\Omega$$

$$= 14.8\Omega$$



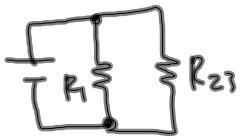
$R_{23} = R_2 + R_3$

$= 20\,\Omega$

$R_1 = 10\,\Omega$ SERIES

$R_2 = 8\,\Omega$

$R_3 = 12\,\Omega$



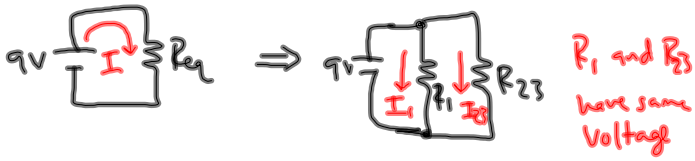
$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_{23}}$

$R_{eq} = 6.67\,\Omega$

- if $V_{Battery} = 9V$, how much current?

$V_{Battery} = I_{total} R_{eq}$

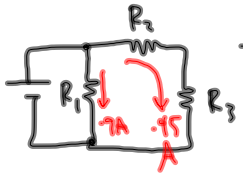
$I_{total} = \frac{V_B}{R_{eq}} = \frac{9V}{6.67\,\Omega} = 1.35A$



- to find current in each branch, divide the voltage by the resistance.

$I_1 = \frac{V_{Battery}}{R_1} = \frac{9V}{10\,\Omega} = 0.9A$

$I_{23} = \frac{V_{Battery}}{R_{23}} = \frac{9V}{20\,\Omega} = 0.45A$

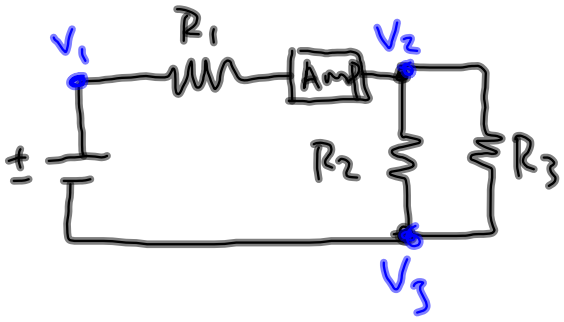


- to find V_2 and V_3, use R_2 and R_3 and I_{23}

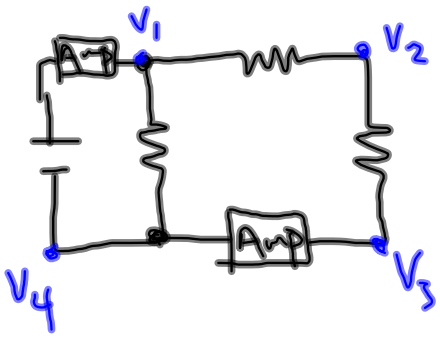
$V_2 = I_{23} R_2 = (.45A)(8\,\Omega) = 3.6V$

$V_3 = I_{23} R_3 = (.45A)(12\,\Omega) = 5.4V$

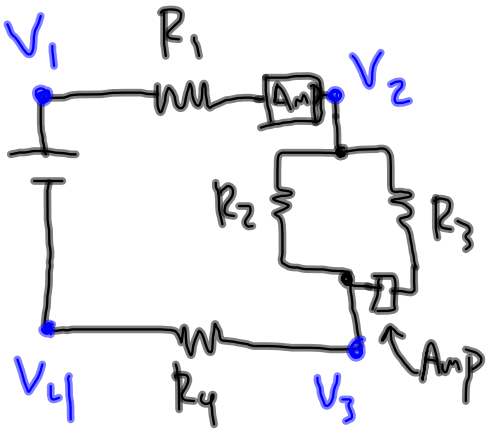
1)


V1
R1
V2
Amp
R2
R3
V3

2)


V1
V2
Amp
Amp
V4
V3

3)


V1
R1
V2
Amp
R2
R3
V4
R4
V3
Amp